

WHAT IS CLAIMED IS:

- 1 1. A portable pressure differential generating system comprising:
 - 2 a portable flow accelerator having a passage therethrough, said passage having a high
 - 3 pressure region with a first cross sectional area and a low pressure region with a second cross
 - 4 sectional area, the first cross sectional area being larger than the second cross sectional area,
 - 5 said accelerator further including:
 - 6 an accelerator low pressure tap in fluid connection with the low pressure region of the
 - 7 flow accelerator, said low pressure tap adapted for fluid connection with a low
 - 8 pressure port of a pressure measuring device;
 - 9 an accelerator high pressure tap in fluid connection with the high pressure region of
 - 10 the flow accelerator; said high pressure tap adapted for fluid connection with a high
 - 11 pressure port of a pressure measuring device; and
 - 12 a portable pump in fluid connection with the passage in the flow accelerator.
- 1 2. The portable pressure differential generating system of Claim 1 further including:
 - 2 a low pressure line in fluid communication with the accelerator low pressure tap,
 - 3 said low pressure line adapted for fluid connection with a low pressure port of a
 - 4 pressure measuring device; and
 - 5 a high pressure line in fluid communication with the accelerator high pressure tap,
 - 6 said high pressure line adapted for fluid connection with a high pressure port of a
 - 7 pressure measuring device.

1 3. The portable pressure differential generating system of claim 1 wherein the pump
2 is configured to create a positive fluid flow away from the pump and force fluid through
3 the passage of the flow accelerator.

1 4. The pressure differential generating system of claim 1 wherein the pump is a
2 vacuum pump configured to draw fluid through the passage of the flow accelerator
3 toward the pump.

1 5. The pressure differential generating system of claim 1 further including:
2 a valve disposed between and in fluid communication with the flow accelerator and the
3 pump, the valve having an upstream side and a downstream side defined by the direction
4 of fluid flow through the valve;
5 a valve low pressure tap in fluid connection with the downstream side of the valve; and
6 a valve high pressure tap in fluid connection with the upstream side of the valve;
7 a range selection device for selecting either a first pressure differential across the
8 accelerator low pressure tap and the accelerator high pressure tap or a second pressure
9 differential across the valve through the valve low pressure tap and the valve high
10 pressure tap.

1 6. The system of claim 1 wherein the ratio of the first cross sectional and the second
2 cross sectional area is between 5:1 and 40:1.

1 7. The system of claim 1 wherein the ratio of the first cross sectional and the second
2 cross sectional area is between 8:1 and 22:1.

1 8. The system of claim 5 wherein the range section device is a valve that has a first
2 state which provides fluid connection of the accelerator high pressure tap to a high
3 pressure outlet and the accelerator low pressure tap to a low pressure outlet and a second
4 state which provides fluid connection of the valve high pressure tap to a high pressure
5 outlet and the valve low pressure tap to a low pressure outlet.

1 9. The system of claim 1 wherein a direction of main fluid flow is away from the
2 pump and wherein the accelerator low pressure tap and valve low pressure tap is a
3 common tap.

1 10. The system of claim 1 wherein a direction of main fluid flow is toward the pump
2 and wherein accelerator low pressure tap and the valve high pressure tap is a common
3 tap.

1 11. The system of claim 5 wherein the range selection device has a first state which
2 provides fluid connection of the accelerator high pressure tap to a low pressure outlet and
3 a second state which provides fluid connection of the valve high pressure tap to a high
4 pressure outlet.

1 12. A portable pressure calibration system comprising:
2 a handheld measurement module having a pressure differential sensor with a high
3 pressure input and a low pressure input;
4 a pressure differential generating module associated with said handheld measurement
5 module, said pressure differential generating module comprising:
6 a portable flow accelerator having a passage therethrough, said passage having a high
7 pressure region with a first cross sectional area and a low pressure region with a second
8 cross sectional area, the first cross sectional area being larger than the second cross
9 sectional area, said accelerator further including:
10 an accelerator low pressure tap in fluid connection with the low pressure region of
11 the flow accelerator, said low pressure tap adapted for fluid connection with the
12 low pressure input of the handheld measurement module;
13 an accelerator high pressure tap in fluid connection with the high pressure region
14 of the flow accelerator; said high pressure tap adapted for fluid connection with
15 the low pressure input of the handheld measurement module; and
16 a portable pump in fluid connection with the passage in the flow accelerator.

1 13. The portable pressure calibration system of claim 12 wherein the pump is
2 configured to create a positive fluid flow away from the pump and forces fluid through
3 the passage of the flow accelerator.

1 14. The pressure differential calibration system of claim 12 wherein the pump is a
2 vacuum pump configured to draw fluid through the passage of the flow accelerator
3 toward the pump.

1 15. The portable pressure calibration system of claim 12 further including:
2 a valve disposed between and in fluid communication with the flow accelerator and the
3 pump, the valve having an upstream side and a downstream side defined by the direction
4 of fluid flow through the valve;
5 a valve low pressure tap in fluid connection with the downstream side of the valve;
6 a valve high pressure tap in fluid connection with the upstream side of the valve;
7 a range selection device for selecting either a first pressure differential across the
8 accelerator low pressure tap and the accelerator high pressure tap or a second pressure
9 differential across the valve through the valve low pressure tap and the valve high
10 pressure tap.

1 16. The portable pressure calibration system of claim 15 wherein the pump is
2 configured to create a positive fluid flow away from the pump and forces fluid through
3 the passage of the flow accelerator.

1 17. The pressure differential calibration system of claim 15 wherein the pump is a
2 vacuum pump configured to draw fluid through the passage of the flow accelerator
3 toward the pump.

1 18. The system of claim 14 wherein the range section device is a valve that has a first
2 state which provides fluid connection of the accelerator high pressure tap to a high pressure
3 outlet and the accelerator low pressure tap to a low pressure outlet and a second state which
4 provides fluid connection of the valve high pressure tap to a high pressure outlet and the
5 valve low pressure tap to a low pressure outlet.

1 19. The system of claim 14 wherein the range selection device has a first state which
2 provides fluid connection of the accelerator high pressure tap to a low pressure outlet and a
3 second state which provides fluid connection of the valve high pressure tap to a high pressure
4 outlet.

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1 20. A method for creating a pressure differential over two ranges comprising:
2 initiating a flow through a valve and a flow accelerator in direct fluid communication
3 therewith by activating a pump in direct fluid communication with the valve;
4 controlling the rate of flow through the valve and the flow accelerator by adjusting the valve,
5 the valve having an upstream side and a downstream side defined by the direction of fluid
6 flow through the valve and the flow accelerator having a high pressure region with a first
7 cross sectional area and a low pressure region with a second cross sectional area, the first
8 cross sectional area being larger than the second cross sectional area;
9 accessing the static pressure differential over the valve through a valve high pressure tap in
10 fluid communication with the upstream side of the valve and a valve low pressure tap on the
11 downstream side of the valve;
12 accessing the static pressure differential over the flow accelerator through an accelerator low
13 pressure tap in the low pressure region and an accelerator high pressure tap in the high
14 pressure region;
15 selecting between the static pressure differential over the valve and the static pressure
16 differential over the accelerator and providing that differential to a low output port and a high
17 output port.

1 21. A method for calibrating a pressure measuring instrument comprising the steps of:
2 dynamically generating a pressure differential with a handheld portable pressure
3 calibration system;
4 isolating the handheld portable pressure calibration system from communicating with a
5 pressure sensor in the pressure measuring instrument;
6 measuring the pressure differential with the handheld portable calibration system
7 allowing the pressure calibration system to communicate with the sensor in the pressure
8 measuring instrument;
9 comparing a pressure reading from the pressure measuring instrument to a pressure
10 reading from the handheld pressure calibration system;
11 adjusting the pressure measuring instrument until the pressure reading from the
12 instrument agrees with the pressure reading from the handheld pressure calibration
13 system.

1 22. A method for calibrating a pressure measuring instrument comprising:
2 connecting a high pressure line and a low pressure line to a pressure measuring instrument;
3 isolating the high pressure line and the low pressure line from communicating with a pressure
4 sensor in the pressure measuring instrument;
5 dynamically generating a pressure differential with a handheld pressure calibration system
6 connected to the high pressure line and the low pressure line;
7 measuring the pressure differential with a handheld pressure calibration system;
8 allowing the high pressure line and the low pressure line to communicate with the sensor in
9 the pressure measuring instrument;
10 comparing a pressure reading from the pressure measuring instrument to a pressure reading
11 from the handheld portable pressure calibration system; and
12 adjusting the pressure measurement instrument until the pressure reading from the instrument
13 agrees with the pressure reading on the handheld portable pressure calibration system.

1 23. The method of calibrating of claim 22 further including the step of adjusting at
2 least one valve in the pressure calibration system to achieve a desired pressure
3 differential.

1 24. The method of calibration of claim 23 further including selecting between a static
2 pressure differential over the at least one valve and a static pressure differential over a flow
3 accelerator contained in the handheld portable pressure calibration system and providing that
4 differential to a low output port and high output port of the handheld portable pressure
5 calibration system.